

REMARKS

Claims 1 to 12 are pending.

Claim Rejections 35 USC 103

Claims 1 to 12 have been rejected under 35 U.S.C 103(a) as being unpatentable over Patent Abstract of Japan JP 07 060074 ("the '074 reference") in view of Zha US patent no. 6,156,200 ("the Zha patent"). Applicants submit that the cited prior art references fail to teach or suggest the claimed subject matter for at least the following reasons.

Claim 1 recites:

1. A filter device comprising:

a plurality of hollow fiber membranes having a bundled end and a free end, and said free end arranged to spread in fluid; and

injection means for injecting fluid or gas to a center portion of said plurality of hollow fiber membranes and outwardly radiating the fluid or gas from the center portion of said plurality of hollow fiber membranes to agitate the hollow fiber membranes. (Emphasis added.)

For example, in one embodiment, FIG. 1 shows an apparatus having bubbling air A1 and raw fluid W1 injected to a pipe 7 to the center portion of hollow fiber membranes 6 and outwardly radiating the fluid or gas from the center portion of the fiber membranes to agitate the hollow fiber membranes.

The Office action states that the '074 reference "fails to teach a means for injecting liquid or gas at the center portion of the hollow fibers to outwardly radiate the fluid or gas other than through the lumen of the hollow fibers." The Office action goes on to state that the Zha patent teaches "injecting liquid or gas to the center of the bundle of fibers through a porous pipe from the bottom of the vessel to outwardly radiate for agitating the fibers." Further, the Office action concludes that it would have been obvious to combine the teachings of the two references to arrive at the claimed invention.

Applicants respectfully submit that the Zha patent neither discloses nor teaches any structure for injecting fluid or gas to the center portion of hollow fiber membranes and radiates the fluid or gas outwardly from the center for at least the following reasons.

In support of this rejection, the Office action cites column 7, line 13-23:

To further improve distribution of air bubbles, a porous tube 16 can be inserted in the centre of the cylindrical module 4. When air passes through porous tube 16, it produces uniform bubbles which pass out through the array of fibres scouring solids on the fibre membrane walls, It will be appreciated that more than one porous tube could be used and such tubes could be distributed throughout the bundle. Fibres of large pore size or made of non-woven material could also be used as porous tubes within the bundle. FIG. 6 illustrates this form of module.

The porous tube 16 referred to above is characterized as being porous (in the horizontal direction) throughout the length of the tube 16 shown as dashed lines in FIG. 6. In addition, FIG. 6 shows gas/air that is uniformly distributed and flows through small holes 10 at the lower end of the module 4 so that air bubbles can be produced between porous members 9 arranged in a membrane module 4. (See column 6, lines 53-56). However, the Zha patent does not provide corresponding small holes for the tube 16 at the lower end of the module 4. Thus, it is clear that gas/air is prevented from being injected into the porous tube 16 along the vertical direction

The Zha patent teaches away from the claimed feature. That is, a feature of the Zha design is to purposely allow air to pass **through** the tube 16 in the horizontal direction, but to prevent air from being **injected** in the vertical direction of the tube because there are no holes to allow injection of air. Otherwise, if air were injected into the tube 16, then the purpose of the tube would be destroyed. The purpose of the tube is to allow air to pass through the tube (vertical direction) and to improve bubble distribution, whereas injecting air in the vertical direction would impair this function. This appears to be the reason why the Zha module passes air through the porous members 9 but not through the tube 16. Thus, the porous tube 16 is a structure that is not adapted for "injecting fluid or gas to a center portion of said plurality of hollow fiber membranes and outwardly radiating the fluid or gas from the center portion of said plurality of hollow fiber membranes to agitate the hollow fiber membranes" as recited in claim 1 of the present application. Therefore, the Zha patent fails to teach or suggest the above quoted feature.

Moreover, one skilled in the art would not have been motivated to combine the teachings of the Zha patent with the teachings of the '074 reference for at least the following reasons. As explained above, tube 16 of the Zha patent fails to perform the same function as well as fails to have the same structure as the above quoted feature of claim 1. Thus, even if the tube of the Zha patent is combined with the teachings of the '074 reference, the claimed subject matter would not result.

Furthermore, the Office action states in the *Response to Arguments* section of the response that during that during backwash "permeate fluid and air being forced out through the lumen of the hollow fibers come out radially through the wall ..." Applicants respectfully disagree for the following reasons.

In the '074 reference, for backwashing, the permeated liquid from the space 5 is pushed into the housing 6 by introducing air into the space 5 from the air introducing port 4. The permeated liquid is **not** directed to the center of the hollow fiber membranes 7 to radiate outwardly but apparently forced straight down by air pressure in a **uniform** manner to discharge through the outlet 2. Thus, it appears that one purpose of uniform distribution of air is to prevent the hollow members from radiating outward, otherwise the '074 reference would have disclosed a mechanism to cause the hollow members to radiate outwardly.

Claims 2, 3, and 4, which recite the injection means directly or indirectly, are similarly not taught or suggest by the cited prior art.

Likewise, claims 5 and 6, which also recite the injection means directly or indirectly, are not taught or suggest by the cited prior art.

Claims 7, 8, 9, 10, 11 and 12 also recite the injection means directly or indirectly are similarly are not taught or suggest by the cited prior art.

All of the pending claims, claims 1 to 12 are believed to be novel and unobvious over the cited prior art.

Art Unit: 1723

Inventor: Yamada      Application Number: 09/931,973      Date: 8/17/01; pd: 8/18/00

Cl. #	Dep. on	Limitation	Semmens 10/97 US 5,674,433	Makoto 7/95 JP 07 060074	Heine 10/00 US 6,126,819
1	--	Filter comprising hollowfiber membrane module	Fig 1	Fig	Fig 5
		Bundled at one end, free at other	24, fig 1	Do	Do
		forming a broom in fluid	26, Fig 1	Do	Do
		Fluid Injection nozzle ... providing agitation	16, fig 1	1, fig	Do
2	--	A cylinder for the fiber bundle	12, fig 1	6, fig	Do
		Rest as in claim 1	As above		Do
3	2	Cylinder is vertical	Obvious	Fig 1	Do
4	--	Claim 2	Claim 2	Clm 2	Do
		Funnel	--	At 2, fig	250, Fig 7
5	--	Claim 4	Claim 2	Clm 2	Do
		Funnel member in cylinder	--		Do
		Upper side filter chamber and lower side recovery chamber (as in up-stream and down stream?)			Fig 7
6	5	Cylinder vertical	Obvious	Obvious	Fig 7
7	--	5 + backwash chamber on top		Fig	9(35-39)
8	2,5,7	Cyl Dia 1.5 to 3 times bundle		Obvious	Obvious
9	2,5,7	Fluid injection means is a pipe opening at the fibers, inserted from bottom of cyl, axially		Obvious Mahendran, US 5,910,250	221, Fig 5
10	9	Ejection port from 1/3 to 2/3 of the bundle height		Dependent on 9	221, fig 5-obvious
11	1,2,4,5,7	Fluid includes fluid and bubbling air		Obvious Mahendran, US 5,910,250	9(15-35)